Technology Opportunity
Glenn Research Center • Cleveland • Ohio
Technology Transfer & Partnership Office
TOP3–00210

Icing Research Tunnel

Facility

The Icing Research Tunnel (IRT) is one of the world's largest refrigerated wind tunnels dedicated to study aircraft icing. In this facility, natural icing conditions are duplicated to test the effects of in-flight icing on actual aircraft components and models of aircraft, including helicopters.

Facility Description

A variety of tests are performed in the IRT including fundamental studies of icing physics, icing prediction validation, and ice protection system development and certification. These tests have been used successfully to reduce flight test hours for ice detection instrumentation and ice protection systems certification.

Facility Benefits

- Duplicates natural icing conditions in a closed-loop atmospheric tunnel for tests of low-speed models
- Tests full-size aircraft components as well as models of airplanes and helicopters
- Creates a uniform test section icing cloud approximately 6 ft high by 6 ft wide
- Tests aircraft ground de-icing and anti-icing fluids
- Enables detailed analysis and electronic storage of ice shape data in addition to a wide variety of data collection and observation methods
- Provides permanent casting and physical tracing of ice formations for extended study
- Accommodates in-house and private industry research programs
- Employs an experienced staff of technicians, engineers, researchers, and operators

Commercial Applications

- Provides next-generation ice protection systems for military and commercial aircraft
- Develops, tests, and certifies methods to prevent ice buildup on aircraft
- Investigates de-icing and anti-icing fluids for use on the ground, de-icing and anti-icing research on aircraft, and certification of ice protection systems for military and commercial aircraft

Sikorsky Black Hawk rotor blade icing test.

Programs and Projects Supported

- Aviation Safety Program (AvSP)
- Hamilton Sunstrand EJR–190 Test
- Lockheed-Martin Joint Strike Fighter Test (JSF)

Capabilities

IRT	
Test section dimensions, ft Height Width Length	 6 9 20
Liquid water content, LWC, g/m^3	.2 to 3.0
Drop size, median volume diameter, MVD, µm	15 to 50
Uniform icing cloud dimensions, ft	4.5×6
Cloud uniformity, percent LWC	±20
Test section air velocity, KTS	50 to 300
Test section total temperature, ˚F	–25 to +40
Simulated engine flow lb/s	1 to 85
Heated auxiliary air (bleed simulation) (at 900° F and 120 psig), lb/s	1

Facility Testing Information

http://facilities.grc.nasa.gov

Contacts

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Boeing V–22 radone icing test.